

Date: May 18, 2001

From: Perry Stutman
Chief Engineer Unlimited,
Steam & Motor Vessels
P.O. Box 296
Queenstown, MD 21658

To: Docket Management Facility <http://dms.dot.gov>
RE: Docket Number [USCG 2001-9269]

Guidelines for Assessing a Merchant Mariner's Proficiency through Demonstrations of Skills as an Officer in Charge of Engineering Watch in a Manned Engine Room or as a Designated Duty Engineer in a Periodically Unmanned Engine Room

GENERAL COMMENTS:

- The performance standards are extremely generalized. They also incorporate a concept that needs to be dispensed with, i.e. "according to the judgment of the assessor."
- Several of the performance measures and/or performance standards are protracted elements of an entire procedure and should not have been presented as a stand-alone performance (e.g. maintenance of an air clutch).
- Many standards are also set to the manufacturer's instruction manuals which for the inexperienced appears to be a good idea. However, while these manuals represent a contract between the manufacturer and the user, they do not always represent the "standard" by which procedures are carried out onboard a vessel and are at times wrong, unclear, or misprinted.
- All in all, the information is sufficiently generalized that it fails to provide the "next step" in establishing base guidance to those who will need to further develop training and practical demonstration assessments.
- While the assessment criteria tables are generalized and need to be modified, the published checklists as presented represent a greater problem and are reproduced with specific comments and notes as:

1. Indicated areas are beyond the scope of the STCW tables for OICEW

AND/OR

2. Traditional tasks have incorrectly presented established procedures (e.g. assessment to respond to a low water casualty.)

Specific comments to related to problems noted in the checklists have been imbedded in an edited copy and included in a separate section of the comparison.

Unless otherwise noted the term "SECOND ENGINEER" refers to the STCW certification and is considered here as being equivalent to that of the U.S. license of First Assistant Engineer

FUNCTION: Marine engineering at the operational level

PAGE #1 - Competency - Use appropriate tools for fabrication and repair operations typically performed on ships

Welding –

A. PRESENTED - The candidate will plan, prepare and safely cut a 3” circular hole in the plate using oxyacetylene process and describe actions as they are being performed.

As stated and without addition information, it is assumed that the circular blank will be uniform at the edges, but this is not realistic. Additional information needs to be provided regarding deviation from the edge of the circle, how much if any grinding of the edge will be permitted and so on. Also we will promote by this process a number of useless 3-inch diameter blanks that will need to be recycled.

ALTERNATE OPINION The candidate will plan, prepare and safely cut out a circular blank flange from ¼” plate corresponding to the dimensions of a two-inch pipe flange with four 7/16” boltholes drilled 90° apart, using oxy-acetylene process.

B. PRESENTED - In a workshop/laboratory or other safe working environment, given proper tools, lighting, ventilation, and two brass or bronze plates of no less than 1/8 inch thickness,

The candidate will plan, prepare and form two plates with a fillet joint design using the brazing process and describe actions as they are being performed.

While the skill of brazing plates is worthy, the use of non-ferrous material is not practical and will result in an unnecessary increase in expense to perform this task as presented. It is more valuable and pragmatic to braze/sweat copper tubing joints.

ALTERNATE OPINION - The candidate will plan, prepare and join two rectangular pieces of sheet metal using the oxy-acetylene brazing process.

PAGE #5

PRESENTED – The candidate will plan, prepare and conduct a non-destructive test on a welded joint [i.e.] a dye penetrant test on a welded joint and report the results.

The dye penetrate test is overkill. If the candidate is to be a certified welder for pressure vessels, or is practicing to be an inspector, then the higher level of welding skill would be worthy, and the use of the dye penetrant test would be necessary. Through this measure and standard we are requiring a skill level not ordinarily required on board a vessel.

Of late the amount of welding has become progressively less than 30 years ago. However, the welding of pipe has become an increasing necessity such as the welding of stock flanges onto

a section of pipe. Hence, it is more important that the weld(s) not leak and this is easily tested by setting up a simple hydro on the pipe section and incorporating the alternative to “A” on page 1

ALTERNATIVE OPINION – Conduct a low-pressure hydro on a one-foot section of 2” pipe, with at least one end fitted with a welded flange, using a blank flange to seal the newly welded flange.

PAGE #6

PRESENTED The candidate will plan, prepare and thread a blind hole using a set of hand taps and describe actions as they are being performed.

At a minimum, it is necessary to indicate whether or not the thread is to be “national course”, “national fine”, or even pipe thread.

PAGE #7

PRESENTED The candidate will plan, prepare and make an external thread using and describe actions as they are being performed.

NOTE: there is a specific difference between the two sets of taps and dies sited. Even more critical is to avoid the candidate from using pipe thread taps and dies in this assessment as there is an even greater difference in pipe threads than with the former two threads.

PAGE #8

PRESENTED The candidate will find and explain the components, AND the operating characteristics, and perform measurements or trouble shooting a fault of the electrical distribution system

1) This specific performance behavior includes troubleshooting and is not in line with table A-III/1, but rather the competencies listed in A-III/2.

2) By the use of the term “electrical distribution system” this specifically applies to the main electrical distribution switchboard. It is one thing for the “candidate to find and explain the components, and the operating characteristics, but by specifying the distribution system this indicates that they are to carry this out on the main switch board versus a branch circuit. This concept is not an intrinsically safe idea.

Page #9

PRESENTED - The candidate will plan and use the Megger to measure and record the resistance of the motor through connections in the controller, describing actions as they are being performed.

ALTERNATIVE OPINION – Revise as: The candidate will plan and use the Megger to measure and record the dielectric strength of the insulation resistance of the motor through connections in the controller to the motor through connections in the controller, describing actions as they are being performed.

PAGE #10

PRESENTED – The candidate will plan use the phase sequence indicator to determine and report the phase rotation, describing actions as they are performed.

ALTERNATIVE OPINION – Either rewrite or eliminate

This may be an interesting experiment to do in an electrical studies lab, BUT rotation of the motor shaft is the more important aspect of the performance outcome of phase or rotation.

The way this is tested onboard a vessel is by starting the motor AND if it is not turning in the direction indicated on the driven device, then the procedure is to remove and switch any two of the three power supply cables (leads). This situation is more apt to occur when connecting the vessel to shore power, which of itself is not done more frequently than once every two years.

COMPETENCE: Maintain a safe Engineering watch

PRESENTED - The candidate will name the alarm, acknowledge the alarm, confirm the condition indicated by the alarm and take appropriate action to correct the alarm condition:

- Low lubrication oil pressure alarm;
 - Low jacket water pressure alarm;
 - High lubrication oil temperature alarm;
 - General alarm; and,
 - Mist detector.
1. The list is insufficient.
 2. While there are common elements for watch keeping on steam and motor vessels, there are an extensive number of elements that are drastically different and the watch standing practices between the two types of power plants need to be identified.
 3. Depending upon the extent of automation, there may be as many as 250 individual engine control/system alarms for which the annunciator will be the same for all 250 indicators.
 4. The general alarm is typically an independent system producing a distinctive sound.
 5. The fixed fire extinguishing system prerelease alarm is also independent and produces a sound distinctly different from the general alarm. Also, unlike the other alarms, the fixed fire extinguishing system prerelease alarm is only tested during a full inspection outside of the normal operation and is rarely recognizable by the average engineer.

PAGE #18

PRESENTED – The candidate will plan, describe, and conduct an operational steering gear test, describing actions as they are being performed.

ALTERNATIVE OPINION -

- 1) It is true that EVERY candidate for OICEW needs to be given all aspects of knowledge training regarding the steering gear.
- 2) During their time aboard ship they should be available to accompany the engineer who will “test” the steering gear to understand the procedure taking place.
- 3) HOWEVER, with the exception of a few diesel vessels, the steering gear flat is located away from the engine room. On steam ships this separation is even more pronounced.
- 4) At the time of testing gear on a steam vessel, steam will have already been applied to the main engine. The job of the OICEW is to be on watch in the engine room while steam is on the engine and is not to leave the engine room for any reason.
- 5) Table A-III/1 in no way identifies the steering gear as an assessment of practical skill, where as the Second Engineer (STCW) through Table A-III/2 is indicated as being proficient in “testing” the steering gear.
- 6) Bottom line is that this is not a skill practical demonstration required of an OICEW and should not be included here or in the final publication of the assessment criteria.

The testing of gear by the OICEW is more appropriate as follows:

1. Within twelve hours of posted sailing the OICEW will have coordinated with the OICNW the time by which “gear will be tested.”
2. Uses engine room phone to notify OICNW that engine department is ready to test gear.
3. Candidate responses to movement of engine orders from bridge via engine order telegraph, notifying bridge of any discrepancies, logging same into engine room log book.
4. Bridge will sound ship’s whistle and notify engine room via telephone of any inadequacies of this test.
5. Engine room will telephone senior engineer in steering gear room that bridge is ready to test steering gear.
6. Senior engineer contacts Navigation Bridge when ready to test steering gear.
7. During testing of steering gear, “run” indicator lights and power failure alarms will be observed and noted as functional as appropriate.
8. When testing of ship’s internal communication system, ship’s whistle, engine order telegraph, and steering gear have been completed OICNW will contact engine room and relate any problems noted during tests and indicate at what time testing of gear would be logged.
9. Engine room logbook entry will be made as “Tested all gear at “ “ hours.
10. Engine room bell log will be prepared for pending departure also noting time that all gear was tested.

PRESENT – The candidate will plan for and start up a refrigeration system, describing actions as they are being performed. AND The candidate will plan for and secure a refrigeration system, describing actions as they are being performed.

ALTERNATIVE OPINION - While this task should be done as part of refrigeration training, it was agreed upon at the September 1999, MERPAC working group that these were not to be assessed tasks of proficiency as only the monitoring of the system are the normal duties of the OICEW and NOT the tasks of starting and securing. They have been and remain the duties of the First A/E and Chief.

PAGE 20/21

PRESENTED - The candidate will plan for start up of the compressor describing actions as they are being performed.

NOTE: The air compressor needs to be identified as to whether it is a low-pressure unit or high pressure,

The air compressor operation should be part of the overall watch standing routine and not presented as a separate function.

Further, the securing of one unit and the starting of the stand-by unit go hand in hand.

ALTERNATIVE OPINION - the candidate will plan for securing the on-line low pressure ship's service air compressor and start up and place on line the stand-by unit.

PAGE 23/24

PRESENTED - The candidate will plan for and start the lube oil purifier, describing actions as they are being performed. AND The candidate will plan for and secure a running lube oil purifier, describing actions as they are being performed.

ALTERNATIVE OPINION - While there are similarities in principles of operation between a lube oil centrifuge and that of fuel oil centrifuges there are significant differences in installation, set-up of operation. Also and very important, due to the use of "self-cleaning" centrifuges for heavy fuel oil processing on large low speed diesel plants, these latter units are typically more sophisticated in component design and as well as being computer controlled.

These differences need to be noted and emphasized as someone who can successfully start an installation of multiple centrifuges for large low speed plant operation, will be able to start a less sophisticated L.O. centrifuge, the reverse however, is not true.

Further, while it has become quite common to refer to these devices as "purifiers", there are three conditions under which centrifuges may be set up to operate.

- 1) Clarification is the act of removing solids from liquids.

- 2) Separation is the act of removing one liquid from another liquid (historically, these units were first used in the dairy industry to “separate “ cream from milk.)
- 3) Purification is the act of removing solids and liquids simultaneously from the primary liquid.

As all lube oil centrifuges were set up to operate in a manner that would unavoidably remove both solids and water from lube oil simultaneously, they were referred to as “purifiers” and have therefore become a generic term, even though the semantics are important. However, on large low speed diesel vessels, designed to burn heavy residual fuels, two centrifuges are typically installed. One of these may be specifically set up as separator and the second in operated in series with the first, would be set up to operate as a “clarifier”. The overall operation of these installations are more complex than that of a single L.O. centrifuge.

NOTE: NEED TO DEVELOP RELEVANT ASSESSMENT CRITERIA FOR MULTIPLE INSTALLATION, SELF-CLEANING HEAVY FUEL OIL CENTRIFUGES.

PAGE 24

A. PRESENTED - the candidate will plan for and prepare a main propulsion diesel engine for operation, describing actions as they are being performed.

NOTE: Table A-III/1 does not require the OICEW to be able to prepare the engine on their own, but must be able to assist in preparing to maneuver as this is the task of the Second Engineer or Chief Engineer.

ALTERNATIVE OPINION - The candidate will plan for and assist in preparing a main propulsion diesel engine for operation.

PAGE #25

B. PRESENTED - the candidate will plan for and secure a main propulsion diesel engine, describing actions as they are being performed.

NOTE: Table A-III/1 does not require the OICEW to be able to secure the main engine on their own, but must be able to assist, as this is the task of the Second Engineer or Chief Engineer.

ALTERNATIVE OPINION - The candidate will plan for and assist in securing a main propulsion diesel engine for operation.

PAGE 26

A. PRESENTED - the candidate will plan for and prepare a main steam turbine for operation, describing actions as they are being performed.

NOTE: Table A-III/1 does not require the OICEW to be able to prepare the main engine on their own, but must be able to assist, as this is the task of the Second Engineer or Chief Engineer.

ALTERNATIVE OPINION - The candidate will plan for and assist in preparing a main steam turbine for operation.

PAGE 28

PRESENTED - the candidate will plan for and secure a main steam turbine, describing actions as they are being performed

NOTE: Table A-III/1 does not require the OICEW to be able to secure the main engine on their own, but must be able to assist, as this is the task of the Second Engineer or Chief Engineer.

ALTERNATIVE OPINION - The candidate will plan for and assist in securing a main steam turbine, describing actions as they are being performed.

PAGE 29/30

PRESENTED - the candidate will plan for and light off a main propulsion boiler, describing actions as they are being performed. AND the candidate will plan for and secure a main propulsion boiler, describing actions as they are being performed

NOTE: The assessment criteria table declines to stipulate a detailed performance standard, however, the accompanying checklist attempt to provide the details of these processes. The checklist, however, are not accurate and require additional work.

PAGE 33

A. PRESENTED – The candidate will check and report the boiler water level, describing actions as they are performed.

NOTE: This is an essential part of the watch routine and in particular of the fireroom watches. Water level control, however, is normally provided by an automatic control system, which periodically needs to be adjusted depending upon load changes to the boiler and climatic changes. Focusing on this one function as a singular assessment is counterproductive to all of the individual tasks necessary for determining the proficiency of the candidate. This aspect of watchstanding in a fireroom needs to be provided and addressed separately, but as part of a coordinated watchstanding procedure.

PAGE 31

PRESENTED - The candidate will test the boiler water for the following:

- ~~Phenolphthalein alkalinity;~~
- total alkalinity;
- chloride;
- phosphate;
- ~~hardness;~~
- ~~pH value~~
- dissolved oxygen;
- total dissolved solids; and,
- ~~hydrazine~~

NOTE:

- 1) WHEN A **TOTAL ALKALINITY** TEST IS PERFORMED, THE ADDITIONAL INDICATED TESTS FOR **PHENOLPHTHALEIN** AND **pH VALUE** ARE REDUNDANT.
- 2) THE "HARDNESS" TEST WAS ELIMINATED MORE THAN 30 YEARS AGO, EVEN WHEN THE USCG REQUIRED CANDIDATES TO PERFORM BOILER WATER TESTS BEFORE AN INSPECTOR, THIS TEST WAS NOT CONDUCTED, AS IT BECAME REDUNDANT WHEN THE BOILERS WERE TREATED WITH AND TESTED FOR PHOSPHATE LEVELS.
- 3) **HYDRAZINE**, A KNOWN CARCINOGEN, HAD BEEN ADDED TO THE CONDENSATE AS AN OXYGEN SCAVENGER. IT WAS PROHIBITED FROM USE IN THE 80'S AS SOME STEAM SHIPS USING THE MAIN CONDENSATE FOR EVAPORATOR DISTILLING CONDENSER COOLING ENDED UP LEAKING INTO THE POTABLE DISTILLED TANKS AND CASES OF CANCER INCREASED DURING ITS USE AND WAS EVENTUALLY BANNED.

PAGE 33/34

PRESENTED - The candidate will plan for and respond to a boiler high water alarm, describing actions as they performed. AND The candidate will plan for and respond to a boiler low water alarm, describing actions as they performed.

THERE ARE SEVERAL PROBLEMS WITH EACH OF THESE ASSESSMENTS:

- 1) *THE PERFORMANCE CONDITION INDICATES USING "AN APPROVED SIMULATOR AND GIVEN ACCESS TO A MAIN OR AUXILIARY BOILER."*

THE ONLY THING THAT IS COMMON TO EITHER A HIGH WATER OR A LOW WATER CASUALTY FOR A MAIN OR AUXILIARY BOILER ARE THE TERMS BOILER, WATER, FIRES, ETC.

THE RESPONSES MAY ON THE SURFACE APPEAR THE SAME, BUT OTHER CONDITIONS MUST BE ANSWERED IF ONE OF THE MAIN PROPULSION BOILERS MUST BE SECURED WHILE ADJUSTING THE WATER LEVEL

CORRESPONDINGLY I.E. SLOWING THE MAIN ENGINE, ASCERTAINING THAT THE OTHER BOILER IS CONTINUING TO FIRE PROPERLY. HENCE THE CANDIDATE MUST AT THE SAME TIME SET UP THE PLANT AS IF GOING INTO THE MANEUVERING MODE. IT IS THEREFORE INAPPROPRIATE TO INFER THAT THE DEMONSTRATED RESPONSE COULD BE DONE ON EITHER BOILER TYPE

- 2) WITH THE EXCEPTION OF THE SIMULATOR AT CAL MARITIME, OTHER PC SIMULATION PROGRAMS ARE NOT EFFECTIVE IN MIMICKING A HIGH WATER CASUALTY (UNABLE TO REPLICATE USE OF MAIN AND AUXILIARY FEED SYSTEM SURFACE OR BOTTOM BLOW NECESSARY TO REDUCE WATER LEVEL).
- 3) THERE ARE OTHER CONDITIONS OF FEEDBACK THAT THE SIMULATORS CAN **NOT** PROVIDE AND THEREFORE ASSESSING SUCH A DEMONSTRATION AS BEING PROFICIENT IS NOT APPROPRIATE FOR A MAIN PROPULSION BOILER, AS IT MAY BE AS PART OF TRAINING ONLY TO SURPLANT A WRITTEN SET OF RESPONSES.
- 4) FURTHER, TO EXPECT THIS TASK TO BE ASSESSED ONBOARD A SHIP WOULD GO AGAINST THE GRAIN OF THE CAUTION STATED IN STCW, SECTION A-I/6-2 "...TRAINING AND ASSESSMENT WILL NOT ADVERSELY AFFECT THE NORMAL OPERATION OF THE SHIP.... AND THIS IS CERTAINLY AN ABNORMAL CONDITION THAT COULD BE CATASTROPHIC.
- 5) LASTLY, THE PERFORMANCE BEHAVIOR CALLS FOR THE CANDIDATE TO "PLAN" FOR A HIGH OR LOW WATER CASUALTY. PLANNING MAY BE A "NICE" TERM FROM THE STANDPOINT OF INSTRUCTIONAL SYSTEM DESIGN, BUT THIS IS A CASUALTY AND CORRECTLY PRACTICING IS APPROPRIATE, NOT TO PLAN.

PAGE #35

PRESENTED - The candidate will plan for and conduct a ballasting operation, describing actions as they are being performed

NOTE: BALLASTING AND DEBALLASTING MUST BE SPECIFIED IN REGARDS TO ENGINE ROOM OPERATIONS, I.E. FUEL OIL DOUBLE BOTTOMS AND FUEL OIL WINGS TANKS.

ALTERNATE OPINION - The candidate will plan for and conduct a ballasting operation of fuel oil double bottom or fuel oil wing tanks, describing actions as they are being performed.

PAGE #36

PRESENTED - The candidate will plan for and conduct a deballasting operation, describing actions as they are being performed

ALTERNATE OPINION - The candidate will plan for and conduct a deballasting operation of fuel oil double bottom or fuel oil wing tanks, describing actions as they are being performed.

Function: Electrical, electronic and control engineering at the operational level

NOTE #20

PAGE #1

PRESENTED: The candidate will plan, and conduct a pre-start-up inspection of a diesel generator, describing actions as they are being performed.

ALTERNATIVE OPINION: The candidate will plan, and conduct a pre-start-up inspection of a diesel [ship service](#) generator, describing actions as they are being performed.

NOTE: BY **NOT** SPECIFYING THE TYPE OF GENERATOR, IT ALREADY HAS BEEN MISCONSTRUED THAT ANY DIESEL GENERATOR WOULD BE SATISFACTORY TO BE ASSESSED IN THIS OPERATION, i.e. EMERGENCY DG.